

ATOMIC STRUCTURE

Slide 1

PF1

Pathan Farheen, 5/5/2020

HISTORY OF THE ATOM

1808

John Dalton



suggested that all matter was made up of
tiny particles that were indivisible and
indestructible and called them

ATOMS

Postulates of Dalton's Atomic Theory

- The matter is made up of indivisible particles known as atoms.
- The properties of all the atoms of a given element are the same including mass. This can also be stated as all the atoms of an element have identical mass while the atoms of different elements have different masses.
- Atoms of different elements combine in fixed ratios to form compounds.
- Atoms are neither created nor destroyed. This implies that during chemical reactions, no atoms are created nor destroyed.
- The formation of new products (compounds) results from the rearrangement of existing atoms (reactants).
- Atoms of an element are identical in mass, size and many other chemical or physical properties, but atoms of two-different elements differ in mass, size, and many other chemical or physical properties.

DALTONS ATOMIC THEORY



Atoms of
element X

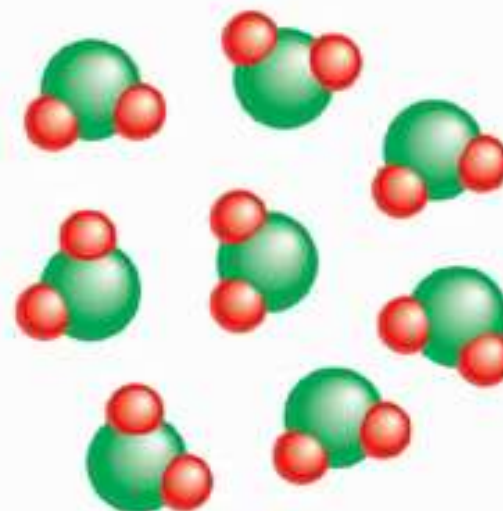
16 X

+



Atoms of
element Y

8 Y



Compound of
elements X and Y

8 X₂Y

Atomic Structure

All **matter** is composed of **atoms**.

Subatomic Particles

Particle	Charge	Mass	Location
Electron (e^-)	-1	0	Electron cloud
Proton (p^+)	+1	1	Nucleus
Neutron (n^0)	0	1	Nucleus

HISTORY OF THE ATOM

1898

Joseph John Thompson

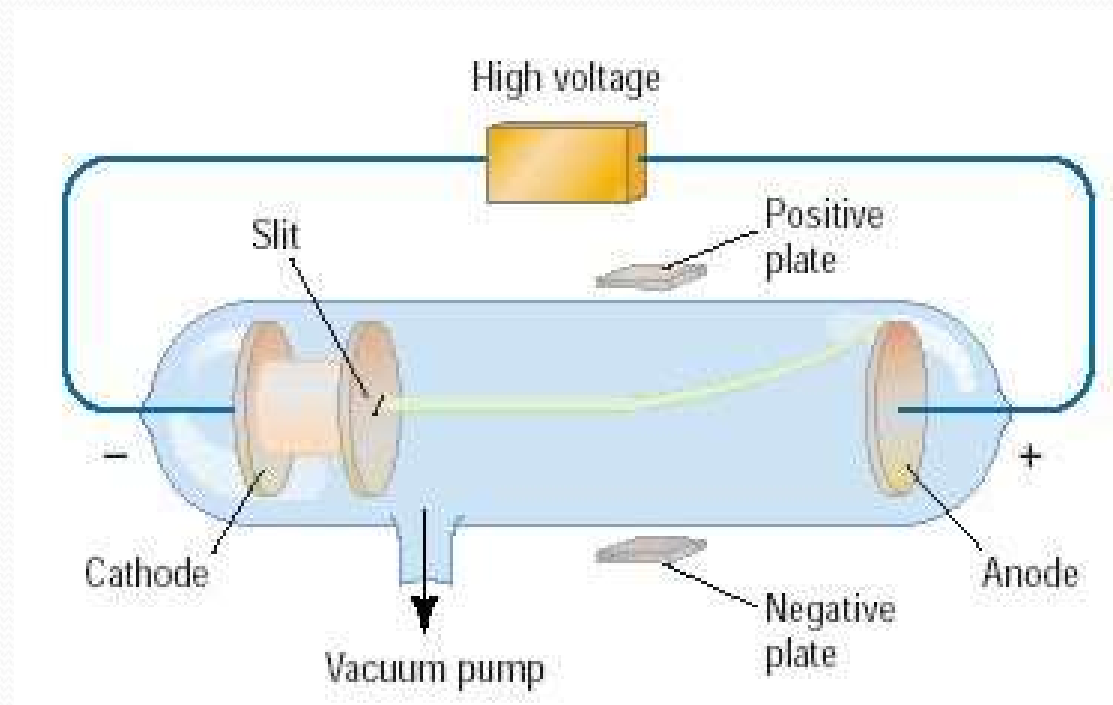


found that atoms could sometimes eject a far smaller negative particle which he called an

ELECTRON

Discovery of the Electron

In 1897, J.J. Thomson used a cathode ray tube to deduce the presence of a negatively charged particle.

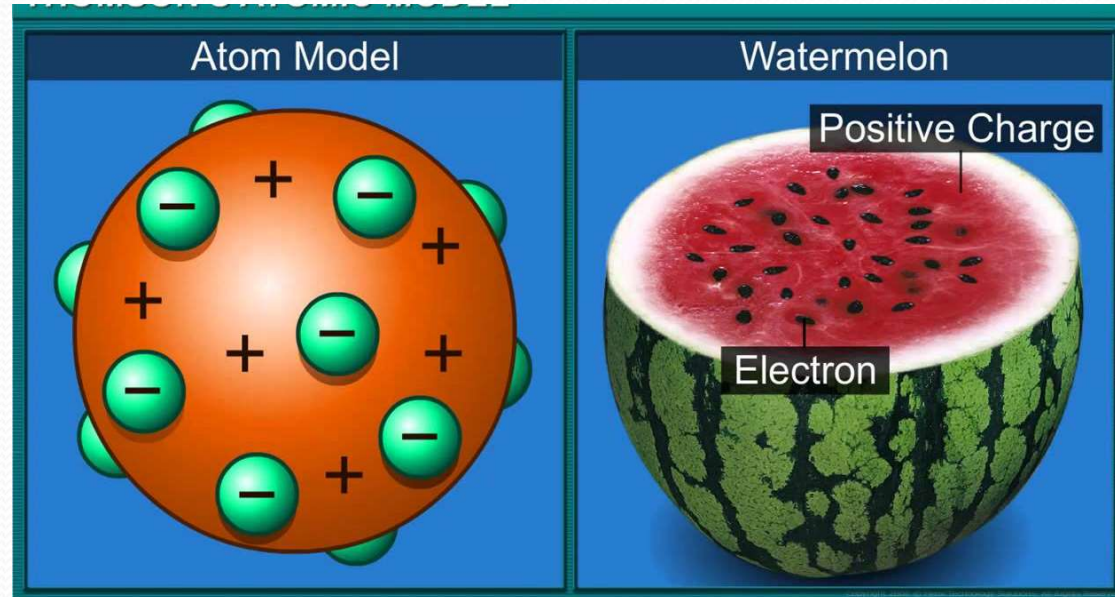


Cathode ray tubes pass electricity through a gas that is contained at a very low pressure.

Conclusions from the Study of the Electron

- ☐ Cathode rays have identical properties regardless of the element used to produce them. All elements must contain identically charged electrons.
- ☐ Atoms are neutral, so there must be positive particles in the atom to balance the negative charge of the electrons
- ☐ Electrons have so little mass that atoms must contain other particles that account for most of the mass

Thomson's Atomic Model



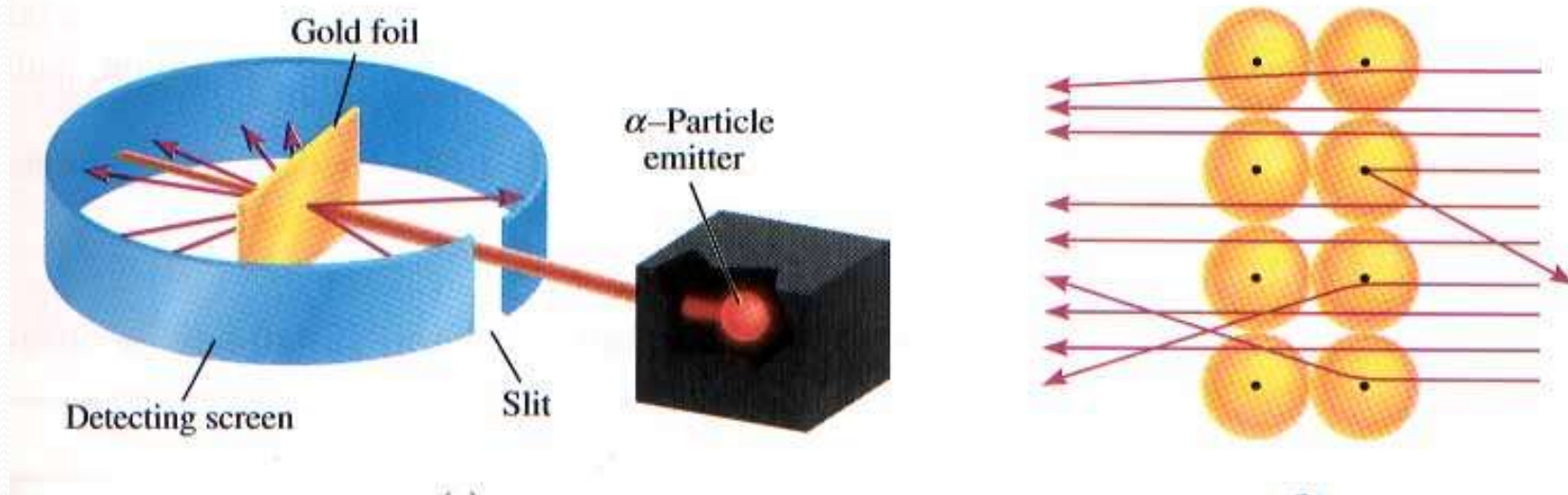
Thomson believed that the electrons were like plums embedded in a positively charged “pudding,” thus it was called the “plum pudding” model.

-Watermelon Model

Thomson proposed that

1. An atom consist of a positively charged sphere and the electrons are embedded in it.
2. The negative and positive charges are equal in magnitude. So, the atom as a whole is electrically neutral.

Rutherford's Gold Foil Experiment

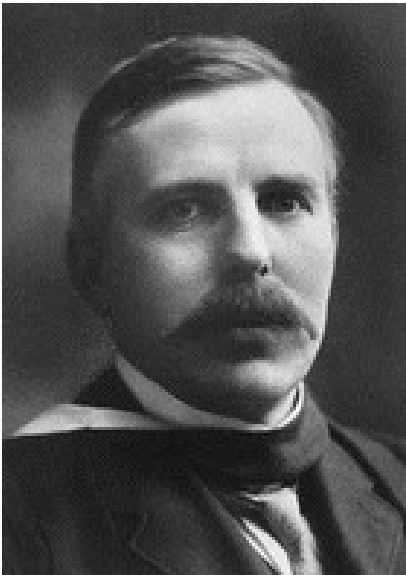


- ❑ Alpha (α) particles are helium nuclei
- ❑ Particles were fired at a thin sheet of gold foil
- ❑ Particle hits on the detecting screen (film) are recorded

HISTORY OF THE ATOM

1910

Ernest Rutherford



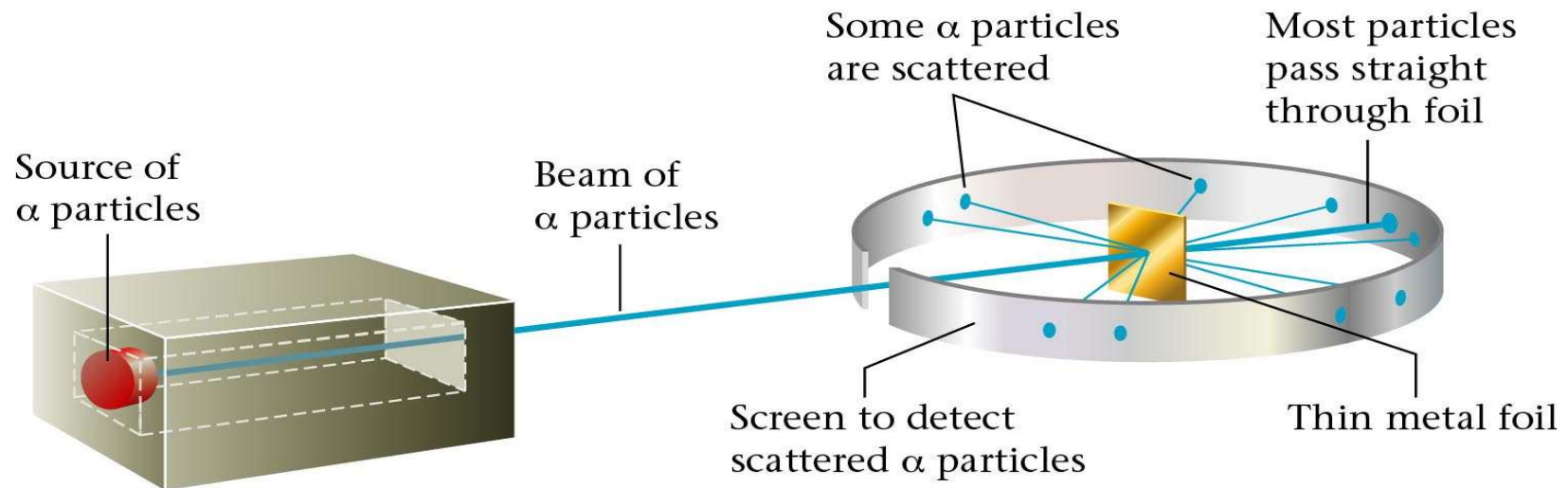
Oversaw Geiger and Marsden carrying out his famous experiment.

they fired Helium nuclei at a piece of gold foil which was only a few atoms thick.

they found that although most of them passed through.

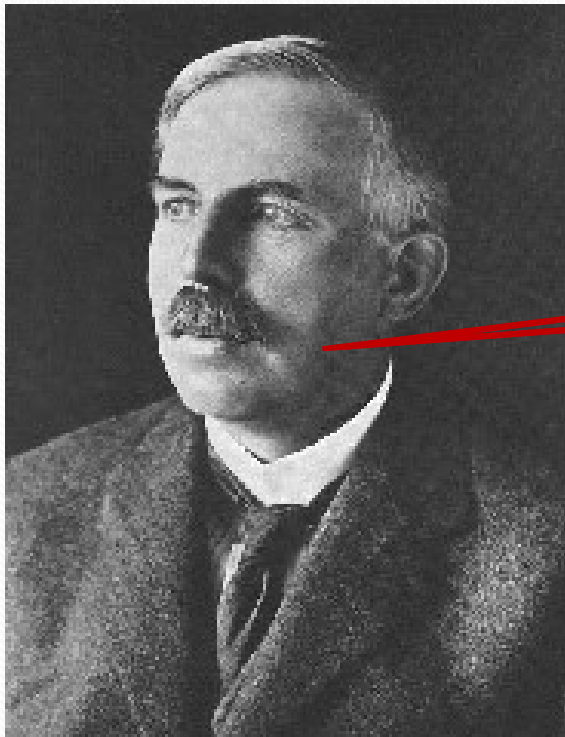
About 1 in 10,000 hit

Rutherford's experiment.



Rutherford's Findings

- ☐ Most of the particles passed right through
- ☐ A few particles were deflected
- ☐ VERY FEW were greatly deflected



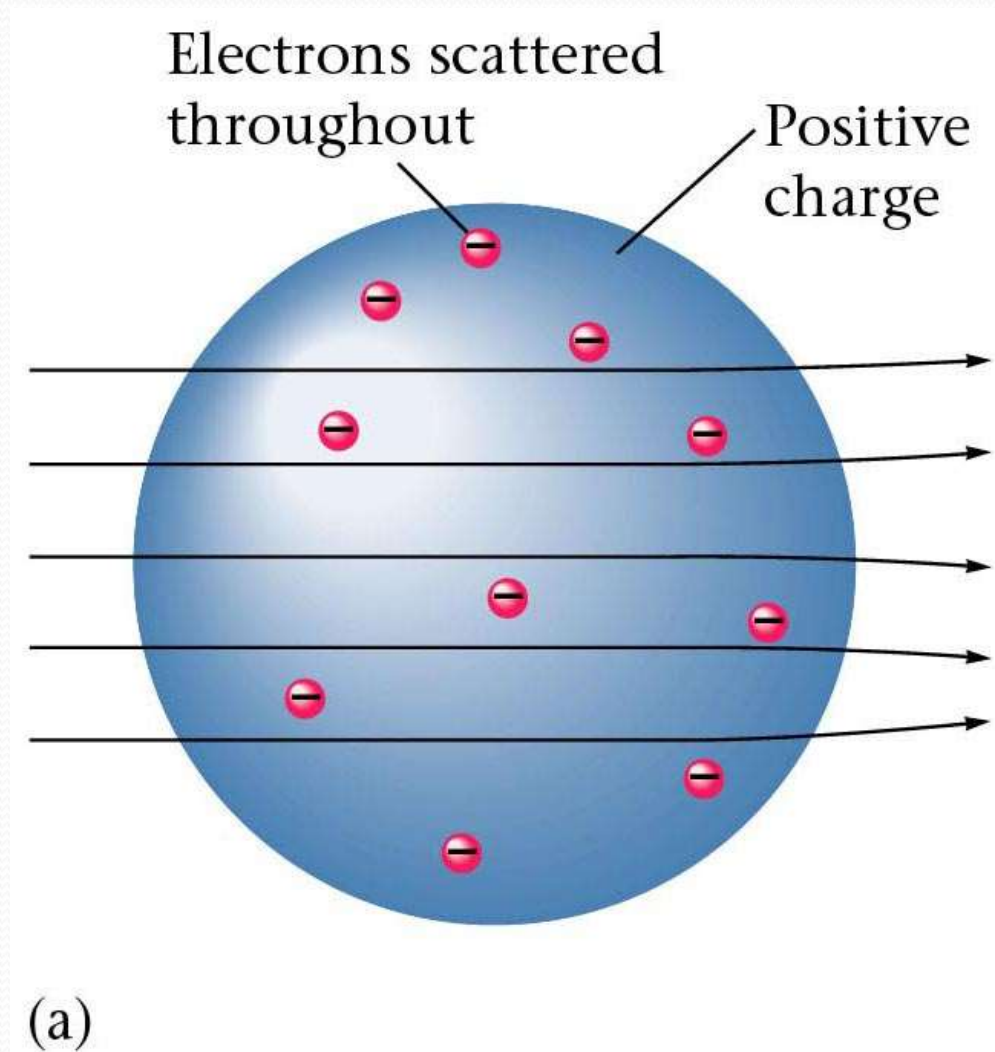
“Like howitzer shells bouncing off of tissue paper!”

Conclusions:

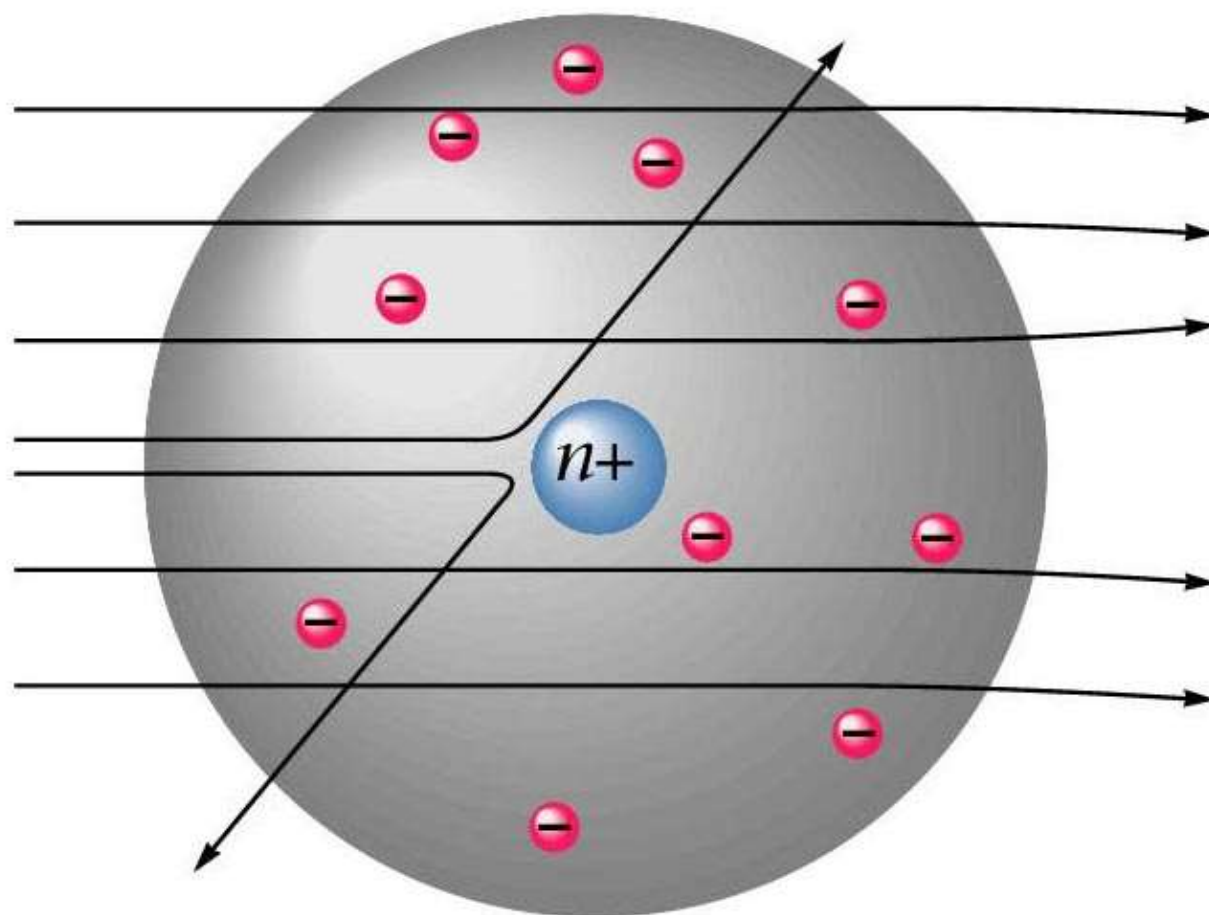
- ☐ The nucleus is small
- ☐ The nucleus is dense
- ☐ The nucleus is positively charged

Results of foil experiment if Plum Pudding model had been correct.

Pathan F.V.



Actual Results.



(b)

Atomic Structure

Atoms are composed of

- protons** – positively charged particles
- neutrons** – neutral particles
- electrons** – negatively charged particles

Protons and neutrons are located in the **nucleus**.
Electrons are found in orbitals surrounding the nucleus.

HELIUM ATOM

